9

Reporting the Results

The purpose of the investigation report is to clearly and concisely convey the results of the investigation in a manner that will help the reader understand *what happened* (the accident description and chronology), *why it happened* (the causal factors), and *what can be done to prevent a recurrence* (the judgments of need). Investigation results are reported without attributing individual fault or proposing punitive measures.

The investigation report constitutes an accurate and objective record of the accident and provides complete and accurate details and explicit statements of:

- The board's investigation process
- Facts pertaining to the accident and relevant management systems involved
- Analytical methods used and their results
- Conclusions of the board, including causal factors of the accident
- Judgments of need for corrective actions to prevent recurrence of the accident.

When completed, this report is submitted to the appointing official for acceptance and dissemination.

9.1 Writing the Report

The report's primary elements include a statement of facts; analysis of those facts; conclusions, including significant facts and the root, contributing, and direct causes of the accident; and judgments of need.

The investigation report is the official record of the investigation; its importance cannot be overemphasized. The quality of the investigation will be judged primarily by the report, which will provide the affected site and the DOE complex as a whole with the basis for developing the corrective actions necessary to prevent or minimize the severity of a recurrence, as well as lessons learned.

TIP

Many previous boards have conducted thorough and competent accident investigations, yet failed to communicate the results effectively in the report. As a result, the causes, judgments of need, and lessons learned often appear unsupported or are lost in a mass of detail.

The report writing process is interactive, yet focused. Guidelines for drafting a report, provided in Table 9-1, will help the board work within the investigation cycle and schedule to maximize their efficiency and effectiveness in developing a useful report.

Table 9-1. Useful strategies for drafting the investigation report.

- Establish clear responsibilities for writing each section of the report.
- Establish deadlines for writing, quality review, and production, working back from the scheduled final draft report due date.
- Use an established format (as described in Section 9.2). Devise a consistent method for referencing titles, acronyms, appendices, and footnotes to avoid last-minute production problems.
- Use a single point of contact, such as the administrative coordinator, to control all electronic versions of the report, including editing input, and to coordinate overall report production.
- Start writing as soon as possible. Write the facts as bullet statements as they are documented. Write the accident chronology as soon as possible to minimize the potential for losing or forgetting the events and to save time when generating the first draft.
- Begin developing illustrations and photograph captions early. These processes take more time than generally anticipated.
- Allow time for regular editorial and board member review and input. Don't wait until the last few days onsite for the board to review each other's writing and the entire draft report. This step is important for assuring that primary issues are addressed and the investigation remains focused and within scope.
- Use a technical writer or editor early in the process to edit the draft report for readability, grammar, content, logic, and flow.
- Share information with other board members.
- Plan for several revisions.

Senior DOE management is placing increasingly greater emphasis on generating concise, yet thorough investigation reports. This approach requires board members to communicate the significant facts, analyses, causal factors, conclusions, and judgments of need with as little extraneous narrative as possible. Inherent in this approach is the need for reports to provide helpful and useful information to line managers to assist them in enhancing their safety programs.

9.2 Report Format and Content

The investigation report should consist of the elements listed in Table 9-2. Although DOE Order 225.1 does not specifically require some of these elements or prescribe any specific order of presentation within the report, a certain level of consistency in content and format among reports facilitates extraction and dissemination of facts, conclusions, judgments of need, and lessons learned.

Table 9-2. The accident investigation report should include these items.

- Disclaimer
- Appointing Official's Statement of Report Acceptance
- Table of Contents, including list of exhibits, figures, and tables
- Acronyms and Initialisms
- Glossary of Technical Terms (if necessary)
- Prologue—Interpretation of Significance
- Executive Summary
- Introduction—Scope of Investigation, Description of the Accident, Brief Description of Site, Facility, or Area where the Accident Occurred
- Facts and Analysis
- Conclusions and Judgments of Need
- Minority Report (if necessary)
- Board Signatures
- Board Members, Advisors, Consultants, and Staff
- Appendices

The following are brief descriptions and acceptable examples of the elements of a typical accident investigation report.

9.2.1 Disclaimer

The accident investigation report disclaimer should appear on the back of the title page of the report. The disclaimer is a statement that the report neither determines nor implies liability. It should be worded exactly as the example below, with the substitution of the appointing official and designated type of accident investigation (i.e., A or B) relevant to the given accident (these items are shaded in the example).

EXAMPLE: DISCLAIMER

This report is an independent product of the Type A Accident Investigation Board appointed by Tara O'Toole, M.D., M.P.H., Assistant Secretary for Environment, Safety and Health (EH-1).

The Board was appointed to perform a Type A Investigation of this accident and to prepare an investigation report in accordance with DOE Order 225.1, *Accident Investigations*.

The discussion of facts, as determined by the Board, and the views expressed in the report do not assume and are not intended to establish the existence of any duty at law on the part of the U.S. Government, its employees or agents, contractors, their employees or agents, or subcontractors at any tier, or any other party.

This report neither determines nor implies liability.

9.2.2 Appointing Official's Statement of Report Acceptance

After reviewing the draft final report, the appointing official signs a statement indicating that the investigation has been completed in accordance with procedures specified in DOE Order 225.1 and that the findings of the accident investigation board have been accepted. An example of this statement is provided below.

EXAMPLE: OFFICIAL'S ACCEPTANCE STATEMENT

On [Date], I established a Type [A] Accident Investigation Board to investigate the [Fall] at the [Facility] at the [Site] that resulted in the [Fatality of a construction worker]. The Board's responsibilities have been completed with respect to this investigation. The analysis, identification of direct, contributing, and root causes, and judgments of need reached during the investigation were performed in accordance with DOE Order 225.1, *Accident Investigations*. I accept the findings of the Board and authorize the release of this report for general distribution.

Signed

Tara O'Toole, M.D., M.P.H.
Assistant Secretary
Environment, Safety and Health

9.2.3 Table of Contents

In addition to a table of contents for the report body, a list of exhibits, figures, and tables and a list of appendices should be included. Typically, the table of contents lists the headings within the report down to the third level. An example is provided for reference on the following page.

9.2.4 Acronyms and Initialisms

Use of acronyms and initialisms* is common among DOE staff and contractors; however, to people outside the Department who may read the report, use of such terms without adequate definition can be frustrating and hinder understanding. This element of the report assists readers by identifying, in alphabetical order, terms and acronyms used in the report. Acronyms and initialisms should be kept to a minimum (see example that follows). Proliferation of acronyms makes it difficult for managers and those unfamiliar with the site, facility, or area involved to read and comprehend the report. Acronyms or initialisms should not be used for organizational elements in the field or position titles. If necessary, a glossary of technical terms should follow this section.

* A acronym is a term that is pronounceable formed from the initial letters or parts of a compound expression such as FORTRAN (formula translation). An initialism is an unpronounceable abbreviation pronounced as letters formed from the initial letters of a compound expression such as EPA (Environmental Protection Agency).

EXAMPLE: TABLE OF CONTENTS

EXHIBITS, FIGURES and TABLES

EXAMPLE: ACRONYMS AND INITIALISMS

CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
EH	DOE Office of Environment, Safety and Health
EM	DOE Office of Environmental Management
ES&H	Environment, Safety and Health
M&O	Management and Operating
OSHA	Occupational Safety and Health Administration

9.2.5 Prologue—Interpretation of Significance

The prologue is a one-page synopsis of the significance of the accident with respect to management concerns and the primary lessons learned from the accident.

TIP

The prologue should interpret the accident's significance as it relates to the affected site, other relevant sites, field offices within the DOE complex, and DOE Headquarters.

EXAMPLE: PROLOGUE

INTERPRETATION OF SIGNIFICANCE

The fatality at the [Site] on [Date] resulted from failures of Department of Energy (DOE), contractor, and subcontractor management, and the accident victim. The subcontractor, the employer of the accident victim, had a poor record of serious safety deficiencies and had never accepted the higher levels of safety performance required by the Department's safe work ethic.

Although all the appropriate contractual and procedural requirements were in place, the subcontractor failed to implement them and continued to allow violations of Occupational Safety and Health Administration regulations invoked by DOE orders. These serious deficiencies were recognized by the prime contractor, which was instituting progressively stronger sanctions against the subcontractor. However, because of the subcontractor's recalcitrance and the imminent danger conditions represented by the subcontractor's frequent violations of fall protection requirements, more aggressive measures, such as contract cancellation, could have been taken earlier.

The prime contractor's oversight was narrowly focused on selective aspects of the subcontractor's safety performance and did not identify the subcontractor's failure to implement its own procedures, or institute appropriate fall protection measures. Thus, the implications and frequency of imminent danger hazards were not fully appreciated. Departmental oversight focused on the subcontractor's performance and did not identify the gaps in the prime contractor's oversight focus. As a result, hazards were not identified and barriers were not in place to prevent the accident, which could have been avoided.

This fatality highlights the importance of a complete approach to safety that stresses individual and line management responsibility and accountability, implementation of requirements and procedures, and thorough and systematic oversight by contractor and Department line management. All levels of line management must be involved. Contractual requirements and procedures, implementation of these requirements, and line management oversight are all necessary to mitigate the dangers of hazards that arise immediately in the workplace. Particular attention must be paid to individual performance and changes in the workplace. Sound judgment, constant vigilance, and attention to detail are necessary to deal with hazards of immediate concern. When serious performance deficiencies are identified, there must be strong, aggressive action to mitigate the hazards and reestablish a safe working environment. Aggressive actions, up to and including swift removal of organizations that exhibit truculence toward safety, are appropriate and should be taken.

9.2.6 Executive Summary

The purpose of the executive summary is to convey to the reader, briefly and concisely, a reasonable understanding of the accident, its causes, and the actions necessary to prevent recurrence. Typical executive summaries are five to seven pages, depending on the complexity of the accident.

The executive summary should include a brief account of:

- Essential facts surrounding the occurrence and major consequences *(what happened)*
- Conclusions that identify the direct, contributing, and root causes, including factors such as the organizational, management system, and line management oversight deficiencies that allowed the accident to happen *(why it happened)*
- Judgments of need for preventing recurrence of the accident *(what must be done to correct the problem and prevent it from recurring)*.

The executive summary should be written for the senior manager or general reader who may be relatively unfamiliar with the subject matter. It should contain only information discussed in the report, but should not include the facts and analyses in their entirety.

EXAMPLE: EXECUTIVE SUMMARY

INTRODUCTION

A fatality was investigated in which a construction subcontractor fell from a temporary platform in the [Facility] at the [Site]. In conducting its investigation, the Accident Investigation Board used various analysis techniques, including events and causal factors analysis, barrier analysis, change analysis, and root cause analysis. The Board inspected and videotaped the accident site, reviewed events surrounding the accident, conducted extensive interviews and document reviews, and performed analyses to determine the causal factors that contributed to the accident, including any management system deficiencies. Relevant management systems and factors that could have contributed to the accident were evaluated in accordance with the guiding principles of safety management identified by the Secretary of Energy in an October 1994 letter to the Defense Nuclear Facilities Safety Board, and subsequently to Congress.

ACCIDENT DESCRIPTION

The accident occurred at approximately [Time] on [Date] at the [Facility] when a construction worker, employed by [Subcontractor], fell from a temporary platform. The platform had been installed to catch falling tools and parts, but it was also used as a work platform for personnel activities when 100 percent fall protection was used. The worker was transported by helicopter to the medical center, where he died at [Time] from severe head and neck injuries.

EXAMPLE: EXECUTIVE SUMMARY (Continued)

DIRECT AND ROOT CAUSES

The **direct cause** of the accident was the fall from an unprotected platform.

The **contributing causes** of the accident were: (1) the absence of signs and barricades in the vicinity of the platform, (2) visibility problems created by poor illumination in the area of the platform, and (3) lack of implementation of job safety analysis, work controls, and the medical surveillance program.

The **root causes** of the accident were (1) failure by [Subcontractor] to implement requirements and procedures that would have mitigated the hazards, and (2) failure by [Subcontractor] to effectively implement the Secretary's guiding principle mandating line management responsibility and accountability for safety performance.

CONCLUSIONS AND JUDGMENTS OF NEED

Conclusions of the board and judgments of need as to managerial controls and safety measures necessary to prevent or mitigate the probability of a recurrence are summarized in Table 1.

Table 1. Conclusions and Judgments of Need

Conclusions	Judgments of Need
■ Comprehensive safety requirements existed, were contractually invoked, and were appropriate for the nature of [Facility] construction work.	None
■ [Subcontractor] failed to follow procedures required by its contract and by its ES&H Program Plan, including: — [Subcontractor] failed to adequately implement fall protection requirements contained in its ES&H Program Plan for the [Facility] project, including enforcement of a three-tiered approach to fall protection. The third tier (choice of last resort) requires anchor points, lanyards, shock absorbers, and full-body harness. — The worker was not wearing any fall protection equipment and did not obtain a direct reading dosimeter before entering the radiological control area.	[Subcontractor] line management and safety personnel need to implement existing safety requirements and procedures.
■ [Subcontractor] and [Contractor] did not fully implement the hazard inspection requirements of the [Facility] contract and [Subcontractor's] ES&H Program Plan, and therefore did not sufficiently identify or analyze hazards and institute protective measures necessary due to changing conditions.	[Subcontractor] and [Contractor] need to ensure that an adequate hazards analysis is performed prior to changes in work tasks that affect the safety and health of personnel.

TIP

The Executive Summary should not include a laundry list of all the facts, conclusions, and judgments of need. Rather, to be effective, it should summarize the important facts; direct, contributing, and root causes; conclusions; and judgments of need.

9.2.7 Introduction

This section of the report, illustrated in the example that follows, normally contains three major subsections:

- A brief background description of the accident and its results, and a statement regarding the authority to conduct the investigation
- A facility description defining the area or site and the principal organizations involved, to help the reader understand the context of the accident and the information that follows
- Descriptions of the scope of the investigation, its purpose, and the methodology employed in conducting the investigation.

TIP

Site and facility diagrams and organizational charts for relevant management systems may be appropriate in either the Introduction or the Facts and Analysis section. However, include this information only when it is needed to clarify the accident's context and the role of related organizations.

9.2.8 Facts and Analysis

This section of the report states the facts related to the accident and the analysis of those facts. It focuses on the events connected to the accident; the factors that allowed those events to occur; and the results of the various analytical techniques used to determine the direct, contributing, and root causes of the accident, including the role of management and safety system deficiencies. This section should logically lead the reader to the conclusions and judgments of need. It includes subsections dealing with:

- ***Accident description and chronology*** , including a description of the responses to the accident
- ***Facts and analysis*** regarding pertinent physical hazards, controls, and other related factors, including management and safety systems
- ***Brief descriptions of and results from analyses*** that were conducted (e.g., barrier analysis, change analysis, events and causal factors analysis, and root cause analysis).

Photographs, evidence position maps, and diagrams, which may provide perspectives that written narrative cannot capture, should be included in the Facts and Analysis section, as determined by the board.

EXAMPLE: INTRODUCTION

1.0 INTRODUCTION

1.1 BACKGROUND

On [Date], at approximately [Time], a construction subcontractor working at the [Site] fell approximately 17 feet from a temporary platform. The platform was built to catch falling tools and parts in the [Facility]. The worker was transported by helicopter to the medical center, where he died from severe head and neck injuries.

On [Date], [Appointing Official Name and Title] appointed a Type A Accident Investigation Board to investigate the accident, in accordance with DOE Order 225.1, *Accident Investigations*.

1.2 FACILITY DESCRIPTION

Contractor activities at [Site] are managed by the DOE XXX Operations Office. The facility in which this accident occurred is under programmatic direction of the Office of Environmental Management (EM).

[Provide a brief discussion of site, facility, or area operations and descriptive background that sheds light on the environment or location where the accident occurred.]

1.3 SCOPE, CONDUCT, AND METHODOLOGY

The Board commenced its investigation on [Date], completed the investigation on [Date], and submitted its findings to the Assistant Secretary for Environment, Safety and Health on [Date].

The **scope** of the Board's investigation was to review and analyze the circumstances to determine the accident's causes. During the investigation, the Board inspected and videotaped the accident site, reviewed events surrounding the accident, conducted interviews and document reviews, and performed analyses of causes.

The **purposes** of this investigation were to determine the nature, extent, and causation of the accident and any programmatic impact, and to assist in the improvement of policies and practices, with emphasis on safety management systems.

The Board conducted its investigation, focusing on management systems at all levels, using the following **methodology**:

- Facts relevant to the accident were gathered.
- Relevant management systems and factors that could have contributed to the accident were evaluated in accordance with the guiding principles of safety management identified by the Secretary of Energy in an October 1994 letter to the Defense Nuclear Facilities Safety Board, and subsequently to Congress.
- Event and causal factors charting, along with barrier analysis and change analysis, was used to provide supportive correlation and identification of the causes of the accident.

Accident Description and Chronology. A subsection describing the accident and chronology of events should be first in the Facts and Analysis section of the report. This section includes:

- Background information about systems and any activities and events preceding the accident, including scheduled maintenance and system safety analysis
- Chronological description of the events leading up to and including the accident itself
- A summary events chart, identifying the major events from the events and causal factors chart.

This is typically one of the first sections written, as soon as evidence is collected and pertinent information is documented. It is reasonable for the board to begin preparing a draft of the accident description and chronology during the first few days onsite. As additional information is collected, new findings can be used to augment the initial writing.

Description and Analysis of Facts. Subsections on the facts surrounding the accident, and the analysis of those facts, should follow the accident description and chronology subsection. These sections must, in conjunction with referenced appendices, provide the full basis for stating the accident's causes and judgments of need.

In writing the report, it is important to clearly distinguish facts from analysis. **Facts** are objective statements that can be verified by physical evidence, by direct observation, through documentation, or from statements corroborated by at least one witness or interviewee other than the one making the statement. **Analysis** is a critical review and discussion of the implications of the facts, leading to a logical interpretation of those facts and supportable conclusions. The analysis should include a brief statement of the impact of the factual circumstances on the accident. Table 9-3 illustrates this distinction.

Table 9-3. Facts differ from analysis.

Facts	Analysis
■ At 9:30 a.m. the outside temperature was 36° F and the sky was clear.	■ Meteorological conditions at the time of the accident did not contribute to the accident.
■ In September 1995, the Environmental Group implemented its own alternate work authorization process. This process did not include a job hazards analysis prior to construction activities.	■ The alternate work authorization process was not adequate to assure worker safety.

Following are some guidelines for developing this portion of the report:

- The subsections should be organized logically according to relevant investigation topics, such as:
  - — Physical hazards
  - — Conduct of operations
  - — Training
  - — Work planning and control
  - — Organizational concerns
  - — Management systems
  - — Maintenance
  - — Personnel performance
  - — Other topics specific and relevant to the investigation.
- For each subsection, list relevant facts in the form of bulleted statements.

TIP

Avoid lengthy narratives. It is more important to lay out the facts in a clear, concise manner that is understandable to the reader. Precede the bulleted facts with a statement identifying them as facts. Include only facts—not conjecture, assumptions, analysis, or opinion.

- For each subsection, provide an analysis of what the facts mean in terms of their impact on the accident and its causes. This narrative should be as concise as possible and may reference the more detailed analyses discussed later in the report (e.g., barrier analysis, change analysis, events and causal factors analysis, and root cause analysis). All facts included in the report should be addressed.

Generally the facts are presented as short statements, and the analysis of the facts provides a direct link between the facts and causal factors. See the example on the next page.

Brief Descriptions and Results from Analyses. Subsections in the Facts and Analysis section should describe the formal analytical methods used during the investigation, as well as the results. For example, if barrier analysis, change analysis, and events and causal factors analysis were performed during an investigation, each of these methods and the results are briefly summarized. There always should be a subsection that includes a discussion of the root cause analysis. If necessary, detailed supporting documentation for analyses performed during the investigation is included in one or more appendices.

EXAMPLE: DESCRIPTION AND ANALYSIS OF FACTS

2.0 FACTS AND ANALYSIS
2.2 PHYSICAL HAZARDS, CONTROLS, AND RELATED FACTORS
2.2.1 Physical Barriers

Facts related to physical barriers on the day of the accident are as follows:

- There were no general barriers, warning lines, or signs to alert personnel on top of the construction materials to the fall hazards in the area. There were no other safety barriers for the platform.
- The platform was intended to catch falling tools or parts, but it was also used as a work platform for personnel with 100 percent fall protection.
- There were no static lines or designated (i.e., engineered) anchor points for personnel to connect fall protection equipment in the vicinity of the platform.
- Lighting in the area of the platform was measured at 2 foot-candles.

Following is the analysis of these facts.

Occupational Safety and Health Standards for the Construction Industry (29 CFR 1926) require that, when working from an area greater than six feet in height or near unprotected edges or sides, personal protection in the form of a fall protection system be in place during all stages of active work. Violations of fall protection requirements usually constitute an imminent danger situation. Lighting in the area was less than the minimum of 5 foot-candles prescribed by the OSHA standards (29 CFR 1925.56). This level of illumination may have contributed to the accident, taking into consideration the visual adjustment when moving from a brighter area to a progressively darker area, as was the case in the area where the accident occurred. There were no permanently installed fall protection systems, barriers, or warnings; each subtier contractor was expected to identify the fall hazards and provide its own fall protection system as they saw fit. The combination of these circumstances was a contributing cause of the accident.

Causal Factors Analysis. Three types of causal factors are identified using analytic methods: direct causes, contributing causes, and root causes. A narrative showing how these are presented in the report is provided on page 9-15. A figure (the events and causal

EXAMPLE: DESCRIPTION AND RESULTS FROM ANALYSES

2.0 FACTS AND ANALYSIS
2.3 CHANGE ANALYSIS

Change analysis was performed to determine points where changes are needed to correct deficiencies in the safety management system and to pinpoint changes and differences that may have had an effect on the accident.

Changes directly contributing to the accident were failure to execute established procedures for fall protection, signs and barricades, and Job Safety Analysis/Construction Safe Work Permit; unsafe use of the temporary platform; insufficient lighting in the platform area; and unenforced work restrictions for the construction worker. No job safety analysis was performed and/or Construction Safe Work Permit obtained for on the platform, leading to a failure in the hazard analysis process and unidentified and uncorrected hazards in the workplace. Deficiencies in the management of the safety program within [Subcontractor] are also related to failures in the medical surveillance program.

Changes brought about by [Subcontractor] management failures resulted in a deficient worker safety program. Management failed to implement the contractual safety requirements necessary to prevent the accident and avoid deficiencies in the worker safety program.

[Contractor's] progressive approach to improving [Subcontractor's] compliance with safety requirements was successful to a degree, but failed to prevent recurrence of imminent danger situations.

factor chart expanding the events summary chart in the Facts and Analysis Section and adding causal factors) showing the logical sequence of the events and causal factors for the accident is included. Each causal factor is generally a brief, explicit statement that summarizes the cause and any of its contributing factors. The causal factors that are identified in the report must be fully supported by the facts and analysis described in the report. If they are not, the board risks reaching erroneous conclusions and producing insufficient or unnecessary judgments of need that will affect the report's credibility.

9.2.9 Conclusions and Judgments of Need

This section of the report lists the board's conclusions in the form of concise statements, as well as the board's judgments of need (discussed in Section 8 of this workbook). The conclusions can be listed using bulleted statements, tables, or diagrams with limited narrative, as long as the meaning is clear. Judgments of need may be presented in the same manner.

Judgments of need are identified actions required to prevent future accidents. Examples of well-written judgments of need are shown on page 9-16.

9.2.10 Minority Report

If used, this section contains the opinions of any board member(s) that differ from the majority of the board. The minority report should:

- Address only those sections of the overall report that warrant the dissenting opinion
- Follow the same format as the overall report, addressing only the points of variance
- Not be a complete rewrite of the overall report.

9.2.11 Board Signatures

The accident investigation board chairperson and members must sign and date the report, even if there is a minority opinion. The signature page identifies the name and position of each board member and the accident investigation board chairperson, as shown as page 9-17. It also indicates whether each board member is a DOE accident investigator.

EXAMPLE: CAUSAL FACTORS ANALYSIS

2.5 CAUSAL FACTORS ANALYSIS

The **direct cause** of the accident was the fall from an unprotected platform. However, there were also **contributing causes** and **root causes**.

Contributing causes for the accident were:

- Job safety analysis, work controls, and medical surveillance program not implemented
- Insufficient illumination in the area of the temporary platform
- Failure to remove the temporary platform
- Absence of warning signs and barricades.

Another possible contributing factor was impaired judgment of the worker who fell from the platform. This cause could not be substantiated.

Root causes of the accident were:

- **Failure by [Subcontractor] to implement requirements and procedures that would have mitigated the hazards.** The implementation of comprehensive and appropriate requirements is the second of DOE's safety management principles. [Subcontractor] failed to implement its medical surveillance program and to enforce work restrictions for the worker. A hazards analysis, required by DOE Order 5480.9 A and the ES&H Program Plan was not conducted; consequently, the hazards associated with the platform were not identified, and no countermeasures were implemented. The absence of fall protection, physical barriers, and warning signs in the vicinity of the platform, along with inadequate lighting, violated DOE requirements that invoke Federal safety standards. Finally, failure to ensure that comprehensive requirements are fully implemented represents a fundamental flaw in the safety management program of [Subcontractor] and exhibits failure to meet the management requisites for the second of DOE's safety management principles requiring that comprehensive and appropriate requirements be established and effectively implemented to counteract hazards and assure safety.

- **Failure by [Subcontractor] to implement the principle of line management responsibility and accountability for safety.** Line management responsibility and accountability for safety is the first of DOE's safety management principles. [Subcontractor] has clear safety policies and well defined responsibilities and authorities for safety. However, [Subcontractor] line management failed to appropriately analyze and manage hazard mitigation and, when faced with adverse consequences for poor safety performance, has refused to accept accountability. [Subcontractor] consistently failed to implement effective safety policies and practices as reflected in DOE policies and industry standards. [Subcontractor] did not meet contractual requirements for safety and its own safety policy. Finally, [subcontractor] failed to ensure that findings resulting from reviews, monitoring activities, and audits were resolved in a timely manner. [Subcontractor's] approach and numerous safety program failures reflect less than full commitment to safety and directly led to the accident.

EXAMPLE: CONCLUSIONS AND JUDGMENTS OF NEED

3.0 CONCLUSIONS AND JUDGMENTS OF NEED

This section of the report identifies the conclusions and judgments of need determined by the Board, as a result of using the analysis methods described in Section 2.0. Conclusions of the Board consider significant facts, causal factors, and pertinent analytical results. Judgments of need are managerial controls and safety measures believed necessary to prevent or mitigate the probability or severity of a recurrence. They flow from the causal factors and are directed at guiding managers in developing followup actions. Table 3-1 identifies the conclusions and the corresponding judgments of need identified by the board.

Table 3-1. Conclusions and Judgments of Need

CONCLUSIONS	JUDGMENTS OF NEED
■ Comprehensive safety requirements existed, were contractually invoked, and were appropriate for the nature of construction work.	None
■ [Subcontractor] failed to follow procedures required by its contract and by its ES&H Program Plan, including: ■ [Subcontractor] failed to adequately implement fall protection requirements contained in its ES&H Program Plan for the project, including enforcement of a three-tiered approach to fall protection. The third tier (choice of last resort) requires anchor points, lanyards, shock absorbers, and full-body harness.	[Subcontractor] line management and safety personnel need to implement existing safety requirements and procedures.
■ A temporary platform, used as a work surface for personnel activities when employing 100 percent fall protection, did not have guardrails and was left in place without barriers or other warning devices. — [Subcontractor] failed to post adequate warning signs and establish barriers on the stack to warn personnel that they were approaching within six feet of the edge of a fall hazard, as required by OSHA regulations and [Subcontractor's's] ES&H Program Plan. — [Contractor] failed to recognize that warning signs and barriers were not in place in the work area near the platform.	[Subcontractor] and [Contractor] need to ensure that safety personnel inspect changing work conditions for previously unidentified safety and health hazards, and implement protective measures.

EXAMPLE: BOARD SIGNATURES

4.0 BOARD SIGNATURES

Signed Date *Dated*
[Name], Board Chairperson
DOE Accident Investigator
U.S. Department of Energy, EH-xx

Signed Date *Dated*
[Name], Board Member
DOE Accident Investigator
U.S. Department of Energy, Rocky Flats

Signed Date *Dated*
[Name], Board Member
DOE Accident Investigator
U.S. Department of Energy, Oak Ridge

Signed Date *Dated*
[Name], Board Member
OSHA Accident Investigator
U.S. Department of Energy, Idaho

Signed Date *Dated*
[Name], Board Member
U.S. Department of Energy, Idaho

9.2.12 Board Members, Advisors, Consultants, and Staff

This section lists the names of the board members, advisors, and staff, indicating their employers and their positions with respect to the accident investigation.

9.2.13 Appendices

Appendices are added, as appropriate, to provide supporting information, such as the accident investigation board's appointment letter and results from detailed analyses conducted during the investigation.

Generally, the amount of documentation in the appendices should be limited. If there is any doubt about the benefit of including material as an appendix, it should probably be omitted. All appendices should be referenced in the report.

EXAMPLE: PARTICIPANTS

5.0 BOARD MEMBERS, ADVISORS, CONSULTANTS, AND STAFF

Chairperson	[Name], DOE (EH-xx)
Member	[Name], DOE-Oak Ridge
Member	[Name], DOE-Rocky Flats
Member	[Name], DOE-Idaho
Member	[Name], DOE-Idaho
Advisor	[Name], DOE (EH-xx)
Advisor	[Name], DOE (EH-xx)
Advisor	[Name], DOE-Albuquerque
Advisor	[Name], DOE-Idaho
Advisor	[Name], Consultant
Medical Advisor	[Name], M.D., Consultant
Legal Advisor	[Name], DOE-Idaho
Administrative Coordinator	[Name], DOE (EH-xx)
Technical Writer	[Name], XYZ Corporation
Technical Editor	[Name], XYZ Corporation
Administrative Support	[Name], DOE-Rocky Flats
	[Name], DOE-Idaho

9.3 Performing Quality Review and Validation of Conclusions

Before releasing the report outside the investigation team, the board reviews it to ensure its technical accuracy, thoroughness, and consistency, and to ensure that organizational concerns, safety management systems, and line management oversight processes are properly analyzed as possible causes of the accident. The following are further considerations for quality review of the report.

Structure and Format —The report should be reviewed to ensure that it follows the format and contains the information outlined in Section 9.2, which ensures compliance with the intent of Section 4.b(3) of DOE Order 225.1. Variation in the format is acceptable, as long as it does not affect the report's quality or conflict with the requirements of the order.

Technical and Policy Issues —All technical requirements applicable to the investigation should be reviewed by appropriate subject matter experts to assure their accuracy. Likewise, a knowledgeable board member or advisor should review whether policy, requirements, and procedures were followed. A board member or advisor knowledgeable in such policy and requirements should also review the report to determine whether these requirements were adequately considered.

Requirements Verification Analysis — Requirements verification analysis should be conducted on the draft report after all the analytical techniques are completed. This analysis ensures that all portions of the report are accurate and consistent, and verifies that the conclusions are consistent with the facts, analyses, and judgments of need. The requirements verification analysis determines whether the flow from facts to analysis to causal factors to judgments of need is logical. That is, the judgments of need are traced back to the supporting facts. The goal is to eliminate any material that is not based on facts.

TIP
One approach to requirements verification is to cut a copy of the draft report apart; compare the facts, analysis, causal factors, and judgments of need on a wall chart; and validate the continuity of facts through the analysis and causal factors to the judgments of need. This method also identifies any misplaced facts, insufficient analyses, and unsupported conclusions or judgments of need.

Classification Review —A classification review should be completed by a classification officer before the report is distributed for the factual accuracy review.

9.4 Conducting the Factual Accuracy Review

When the accident investigation report has been drafted in its final form, but before it is submitted to the appointing official for acceptance, the facts presented in the Facts and Analysis section of the report should be reviewed by affected DOE and contractor line management to validate the factual accuracy of the report contents. Generally, only the facts portion should be distributed for this review, in order to protect the integrity of the investigation and prevent a premature reaction to preliminary analyses. However, other portions of the report may be provided at the discretion of the board chairperson. The review is important for ensuring an accurate report and verifying that all affected parties agree on the facts surrounding the accident. This is consistent with the approach of identifying system deficiencies so that corrective actions can be taken, rather than fixing blame. It also supports and is consistent with the DOE management philosophy of openness in the oversight process.

Some boards have conducted this factual review in the board's dedicated conference room. This allows representatives of affected organizations to review the draft description of the facts and to ask followup questions of board members, while ensuring that dissemination of the draft document remains closely controlled.

Comments and revisions from DOE and contractor management are incorporated into the draft final report, as appropriate.

9.5 Review by the Assistant Secretary for Environment, Safety and Health

DOE Order 225.1, 5.a(5) requires review of Type A and Type B accident investigation reports by the Assistant Secretary. This function has been delegated to the Deputy Assistant Secretary for Oversight (EH-2). Coordination for these reviews should be made with the Program Manager. The Office of Oversight conducts the reviews and provides comments to the appointing official and board chairperson, as appropriate. Board chairpersons should plan sufficient time for this review to maintain the four-week investigation cycle. This review should be scheduled before submission of the report to the appointing official.

9.6 Submitting the Report

Once the report has been finalized, the accident investigation board chairperson provides the draft final report to the appointing official for acceptance. If the appointing official determines that the board has met its obligation to conduct a thorough investigation of the accident, that the report fully describes the accident and its causal factors, and that it provides judgments of need sufficient to prevent recurrence, the report is formally accepted. The statement of report

acceptance from the appointing official is included in the final report (see Section 9.2.2).

KEY POINTS TO REMEMBER

- Begin writing the report as soon as initial evidence is collected.
- Keep pace with writing as the investigation proceeds to avoid having to do all the writing during the third and fourth weeks.
- The primary portions of the report include:
  - — Prologue — Interpretation of Significance
  - — Executive Summary
  - — Introduction
  - — Facts and Analysis
  - — Conclusions and Judgments of Need
  - — Minority Report (if applicable)
  - — Board Signatures
  - — Appendices
- Provide a concise, yet clear discussion of the facts and analyses of the investigation.
- Clearly distinguish between facts and analysis.
- Ensure that the facts and analyses logically lead the reader to the conclusions and judgments of need determined by the board.
- Describe judgments of need so that they can be translated into corrective actions.
- Include appendices as needed, but do not bury important facts in appendices.
- Quality reviews of the report prior to finalization include processes for reviewing structure and format, technical and policy issues, and a requirements verification analysis.
- The factual accuracy of the report is reviewed by submitting it to affected DOE and contractor line management to validate the factual content. This ensures an accurate report and that all affected parties agree on the facts surrounding the accident. Comments and revisions are incorporated as appropriate.
- Requirements verification analysis is conducted on the draft report to ensure that all portions of the report are accurate and consistent. It also verifies that the conclusions are consistent with the facts, analyses, and judgments of need and that the flow from facts to analysis to causal factors to judgments of need is logical. Judgments of needs are traced back to the supporting facts. One method of doing this is to create a wall chart using the applicable portions of the report to depict the flow visually.
- Submit the draft report for review and comment to the Assistant Secretary for Environment, Safety and Health (Office of Oversight) before submitting it to the appointing official for acceptance.